concrete construction

OCTOBER 1958 VOL. 3, NO. 10

EDITED FOR All who are concerned with quality, JOB PLACED CONCRETE (including prestress, tilt-up, lift slab, and thin-shell)—its production, handling, forming, reinforcing, placing, finishing, and curing: CONCRETE CONTRACTORS; GENERAL CONTRACTORS; INDUSTRIAL CONSTRUCTION AND MAINTENANCE MEN; ENGINEERS; ARCHITECTS; STATE HIGHWAY ENGINEERS; READY-MIXED CONCRETE PRODUCERS.

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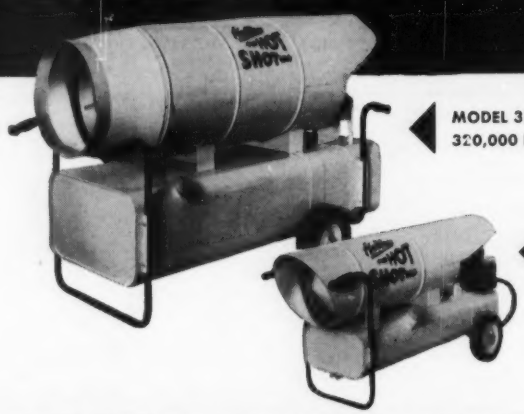

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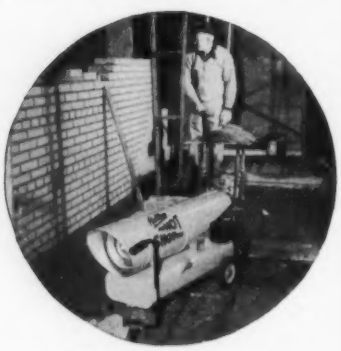

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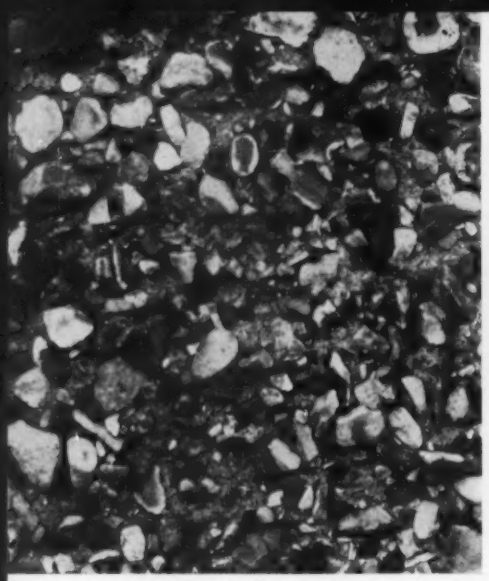


FIGURE 1. In this pebble-dash rendered finish small pebbles or crushed stone of suitable size are thrown into a final coat of freshly applied mortar. The effect is somewhat similar to an exposed aggregate finish.

FIGURE 2. An example of a roughcast or wetdash finish in which the final coat of material, containing some fairly coarse aggregate, is thrown on as a wet mix. Limestone aggregate was used in this case.

EXTERNAL RENDERED FINISHES*

(Part one of three installments)

External finishes for the walls of concrete buildings may be either structural or painted finishes. This article deals with the rendered types of finish, applied either by hand or by mechanical means. The applied finishes may be purely decorative or may combine this function with that of excluding rain from the walls.

EXTERNAL STUCCO FINISHES, applied by plastering methods, were common in many of the earliest and most primitive of buildings. Their history starts with "wattle and daub," in which clay plastering was the finishing material. Lime was probably first used as the binding medium by the Romans, both for internal and external finishes, and the type of mix introduced by them was used for external work with little change or improvement until the latter part of the eighteenth century.

The observation that some kinds of limestone gave a "hydraulic lime," which developed some degree of strength even under water, was followed after 1796 by the development of the so-called "Roman cements" which were burnt from naturally occurring nodules or rock of composition approaching that of portland cement.

The Roman cements were gradually displaced in the latter part of the 19th century by portland cement. This new material was steadily improved in quality, and the stucco or rendered finishes became correspondingly stronger and harder. An attempt to compensate for this was made by using rather leaner mixes, but the working properties of portland cement-sand mixes will not permit the proportion of cement to be

*The information and photographs contained in this article are made available by the Department of Scientific and Industrial Research, London, England.

FILE: FINISHING

FIGURE 3. An example of a scraped finish containing a fairly coarse sand. In this type the final coat of mortar is allowed to stiffen for several hours and then is gone over with a scraper.

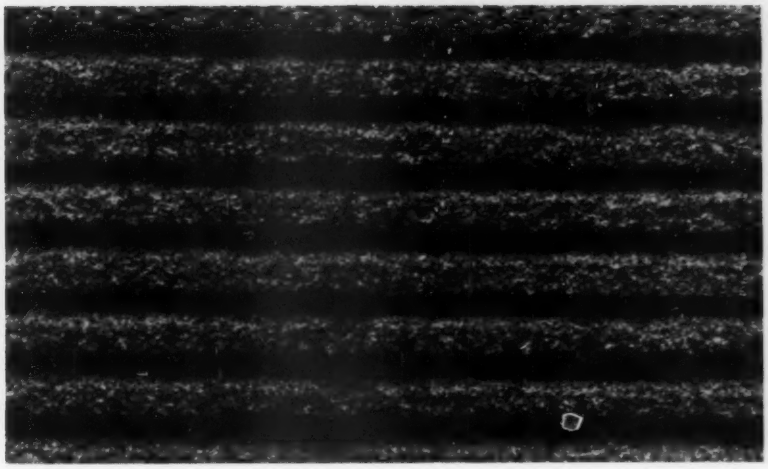


FIGURE 4. A ribbed textured finish, with either horizontal or vertical striations, is produced by treatment of a freshly applied final coat of mortar with various hand tools.

reduced below about 1:3 with coarse clean sands or 1:4 with finer sands. Largely as a result of this strengthening of finishes with the improvement in the cement, cracking of rendered finishes and loss of adhesion on weak backgrounds became common. Investigations and numerous practical trials have made the causes of these defects clear. It is now becoming more widely recognized that to get good appearance and durability the rendering must be chosen to suit both the background to which it is applied and the conditions to which it is exposed, and that materials and workmanship need proper control.

A rendered finish to an external wall may be chosen in preference to other types of finish because it is comparatively cheap. It may also be chosen because of its value in excluding rain; or it may, perhaps more rarely, be chosen because a jointless finish or a particular color and texture are required.

TYPES OF TREATMENT

The types of finishing treatment for external renderings which are available to the user include the following:

Pebble-dash or dry-dash. A rough finish in which small pebbles or crushed stone of suitable size are thrown on to a freshly applied final coat of mortar and left exposed. The pebbles or stones are sometimes lightly pressed or tapped into the mortar after throwing. Figure 1 shows an example of a pebble-dash finish about 15 years old.

Roughcast, wet-dash, or harling. A finish in which the final coat, containing a proportion of fairly coarse aggregate, is thrown on as a wet mix and is left in the rough condition. The coarseness of the texture depends mainly upon the type and size of the coarse aggregate. Figure 2 shows a fairly coarse type with limestone aggregate.

Scraped finishes. Finishes in which the final coat of mortar, after leveling and allowing to stiffen, usually for several hours, is scraped with a steel straight-edge, a board studded with nails, a wood float covered with expanded metal or any other form of tool convenient for the purpose, to give a roughened surface. Figure 3 shows a scraped finish with a rather coarse sand.

Textured finishes. A variety of finishes having textured or patterned surfaces produced by treatment of the freshly applied final coat with various tools. Examples are: ribbed stucco, horizontally or vertically (Figure 4); torn stucco, stippled stucco, fan texture (Figure 5); English Cottage Texture (Figure 6).

Smooth (floated) finishes. Finishes in which the surface is made level and relatively smooth with a float. A wood float is normally used for this, as a steel float gives a surface much more liable to craze.

Machine-applied finishes. A variety of finishes in which the final coat is applied by machines which spatter or throw the material on to the wall, the roughness of the finished surface varying with the material used and the type of machine. Some machines are hand operated, the material being projected on to the wall by sprung tines or "flickers" on a horizontal rotating spindle partly immersed in the mix. Others are mechanically operated, using similar methods of projection, while another group use pneumatic projection from a gun. In Figure 7 two examples of different finishes of this class are shown, one giving a coarse and the other a finer texture.

APPEARANCE OF RENDERED FINISHES

The choice of the sort or color of rendering to be used is largely a matter of individual taste. It is, however, important to realize the probable changes in appearance that will occur over the years, and also the greater difficulty of attaining and maintaining a uniform appearance with some finishes than with others. An opinion of the acceptability of a particular color or texture when new can be formed from trial panels or other buildings finished in the same way, but it is not always possible to examine a building of similar exposure, environment and design on which the finish has been

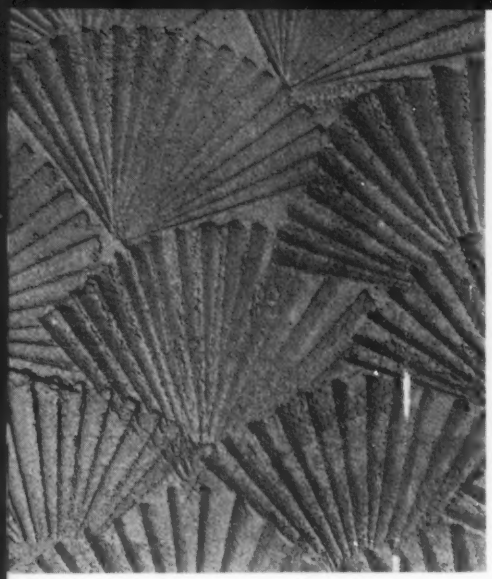


FIGURE 5. Fan texture is another example of the special textures which can be created in rendered finishes.

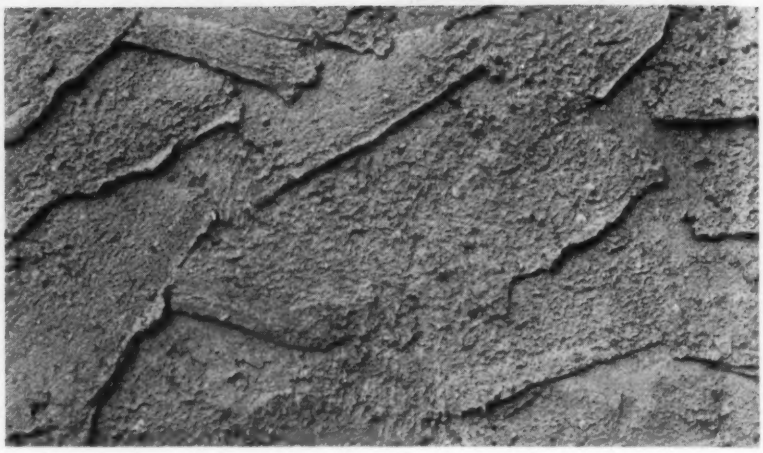


FIGURE 6. This rough finish is called English Cottage Texture. The pattern is generally created with hand trowels.

exposed for a number of years.

Smooth finishes tend to suffer from surface crazing and to become patchy in appearance owing to variations in surface texture which can hardly be avoided in floating; they rarely retain a satisfactory appearance. The risk of crazing is more severe with mixes rich in cement, or when fine sands are used. Steel-troweled finishes are worse than wood-floated finishes in this respect, and should be avoided. Where a rendering is to be painted regularly these defects are less important, and the wood-floated finish is suitable.

Lime, dissolved by the mixing water either from the cement or from lime used in the mix, is always deposited to some extent on the surface of renderings as the water dries out, and forms a white film of calcium carbonate that tends to mask the true color of the finish. The deposit may be worse on some areas than others and thus give a patchy appearance. The effect is more marked under slow drying conditions than with finishes applied in warm dry weather; it often becomes less noticeable with aging. Such fading is more serious with colored finishes, and some of the colored machine-applied finishes and some textured finishes are particularly susceptible. It is preferable, therefore, to use only pale colors, on which the white film is less conspicuous.

Pebble-dash and roughcast are the least liable to change in appearance over long periods. Scraped finishes and some textured finishes in ordinary grey cement also change very little in appearance with time.

Deposits of dirt from atmospheric pollution show more readily on white and pale colored finishes than on the natural grey cement finish. Dirt also appears worse on the heavily textured finishes than on the more finely textured and scraped finishes or on the smooth ones. On the other hand when the design and detailing of the wall surface is such as to produce rain streaks on the wall, the appearance of smooth finishes is more badly affected than that of textured finishes. The problem, so far as dirt is concerned in city atmospheres, is perhaps best resolved by using the darker shades of a fairly fine scraped or textured finish, with adequate detailing to prevent rain runs. When it is intended to maintain the finish by periodical cement painting, smooth finishes will probably be required, in which case correct detailing to prevent rain runs is even more important.

MAINTENANCE REQUIREMENTS

An external rendering, unless it is to be painted, should not require any maintenance over a long period of years. The frequent occurrence of failures may suggest doubts as to the validity of this statement, but with proper attention to external details in designing the building and to specification and workmanship there should be no difficulty in attaining a life of 60 to 100 years. This is confirmed by the existence of much sound work of even greater age, carried out when less was known of the requirements for good work.

If a light-colored or white finish is required, it may be necessary to provide for painting periodically. Either cement paints or oil-bound paints may be used. Repainting with cement paints may be required at intervals of 3 to 10 years according to circumstances. Oil-bound paints are more expensive and they normally require renewal at intervals of 4 to 5 years.

PROTECTION AGAINST RAIN

A rendered finish is often required to give protection against rain penetration through a wall built of masonry units. An unprotected solid wall of brick or block, however impermeable the units themselves may be, is liable to let rain penetrate through the joints, mainly between the mortar and the units where hair cracks usually form. Less porous units may be worse than more porous ones, since they allow the rain water to run down the face and feed the hair cracks. The more porous units allow a more uniform absorption into the face of the wall as a whole, so that penetration through the wall at the weak points is likely to be less, and may in fact only occur under much more severe conditions.

A rendered finish of any type, when properly applied, will close the hair cracks or other vulnerable areas, and even though porous itself it will not allow sufficient water to pass through to feed into the cracks behind. If, however, cracks form in the rendering, enough water may enter to pass right through the wall. The further results of such cracks may be serious, as discussed later. The main conclusion to be drawn is that any rendered finish

TABLE 1

Suitability of Methods of Finishing Renderings for Various Conditions

TREATMENT	SUITABILITY ON VARIOUS BACKING MATERIALS	SUITABILITY FOR VARIOUS ENVIRONMENTS	SUITABILITY FOR VARIOUS EXPOSURE CONDITIONS	REQUIREMENTS
Pebble-dash or dry-dash	Not suitable on weak types of brick or lightweight concrete	All areas, but particularly suitable for rural or coastal areas	Particularly suitable for severe conditions	Less susceptible to defects and deterioration than all other types
Roughcast or harling	All except very weak backing materials	All areas, but particularly suitable for rural or coastal areas	Particularly suitable for severe conditions	Has no common defects and does not require maintenance
Scraped finishes	All backing materials	All areas, but coarser finishes less suitable in the dirtier urban atmospheres	All conditions	Greater freedom from crazing and patchiness of appearance than smooth finishes
Textured finishes	All backing materials	All areas; in the dirtier urban atmospheres tend to accumulate dirt, but are not so prone to streakiness as the smoother finishes	All conditions	Similar to scraped finishes
Smooth floated finishes	All backing materials	All areas, but see note in last column	All conditions	The type most likely to develop defects, including crazing, cracking and patchiness of appearance
Machine applied finishes	All backing materials	Often less suitable for urban conditions, as they show dirt rather badly	All conditions	Do not craze but become patchy or streaky under some conditions
White or light colors in any of above finishes	All backing materials	Less suitable for urban areas	All conditions	Will probably require some maintenance to keep good appearance in urban areas

which is continuous and free from cracks will prevent rain penetration under normal conditions. Where conditions are very severe (for example, a wall in a position exposed to driving rain and wind for long periods) at least one coat of the rendering should be of a fairly impervious kind. This coat should always be the first coat. Pebble-dash or roughcast finishes, with a spatter-dash coat and one rendered undercoat, are most suitable for such conditions; but, provided that the spatter-dash and undercoat are resistant, other types of finishes may be used.

CONDITIONS OF EXPOSURE

The conditions to which a rendering will be exposed must be taken into account in choosing the materials and the type of finish. These conditions, which may vary widely, depend on the position of the building and on its surroundings and use.

In urban areas the accumulation of dirt on the rendering will be a factor weighing against the use of some textured finishes and against white or delicate colors. The greater protection against frost action in urban areas, particularly in buildings with overhanging eaves, makes it possible to use mixes leaner in cement. A 1 : 2 : 8-9 cement : lime : sand mix is suitable under such circumstances.

In rural areas light-colored or white finishes will more often be required and they can be used with much less risk of deterioration than under urban conditions. Any type of finishing treatment can be used successfully. The materials which are most suitable will depend upon the finishing treatment, the district and exposure, and upon the amount of protection given by the design of the building. For scraped or textured finishes the 1 : 2 : 8-9 type of mix is suitable under the more protected and the 1 : 1 : 5-6 type under the more exposed conditions.

In exposed coastal areas the pebble-dash and roughcast finishing treatments have advantages in shedding water or in distributing it over the surface, but textured or scraped finishes may also be satisfactory. The best mix for smooth or textured finishes will generally be the 1 : 1 : 5-6 type, but where there is good eaves protection a mix lower in cement content may be used. An example of frost failure of a 1 : 2 : 9 mix that was applied shortly before the onset of winter, in an area where conditions are relatively severe, is shown in Figure 9; even under these

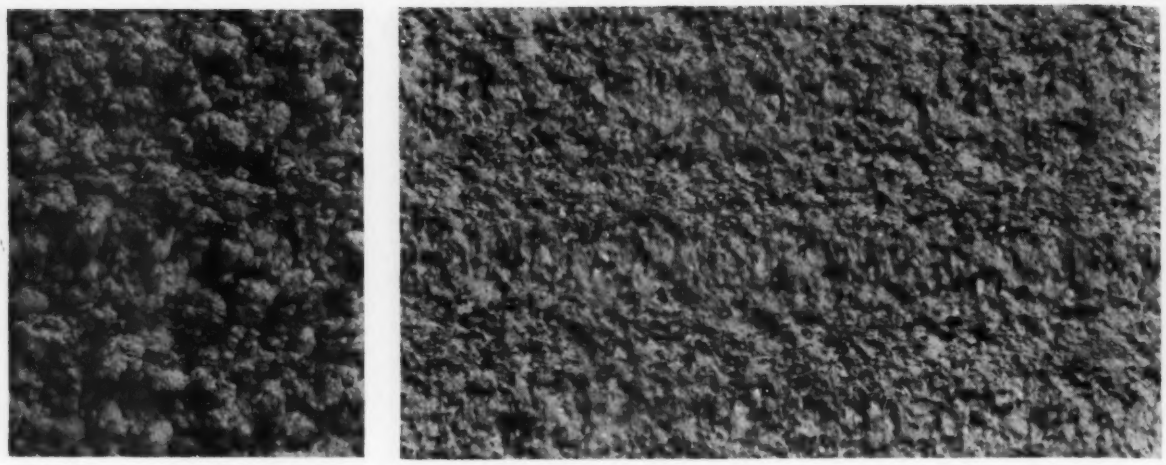


FIGURE 7. Two examples of machine-applied rendered finishes, both created by pneumatic projection of the final coat of material. Aggregate grading and size for the most part determine the relative coarseness of the finish.

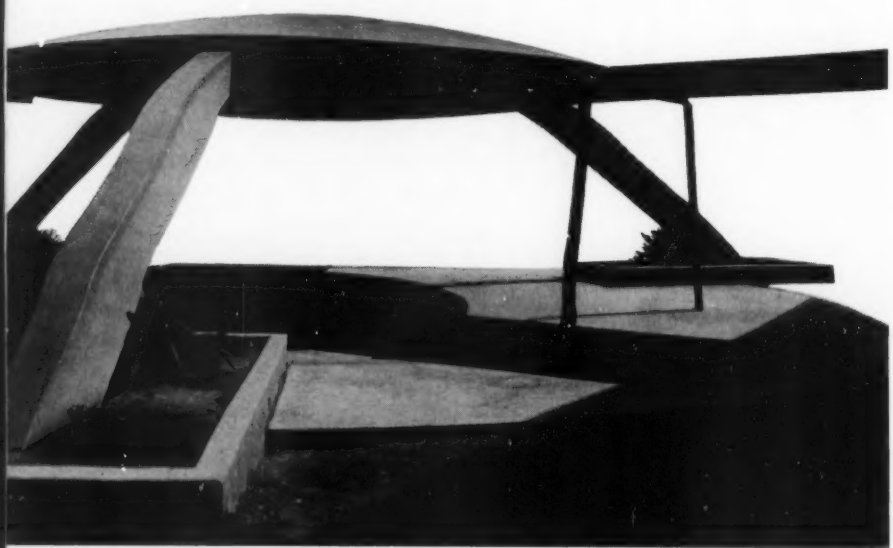
conditions there were only about two patches of failure with this mix, and there were no frost failures with a 1 : 1 : 6 mix.

Where both frost and wet conditions are likely to be severe, or where the work may be directly exposed to salt spray, it is essential with any type of rendered finish that the building should be properly detailed to exclude moisture and that the backing materials should not be of a kind likely to cause trouble with renderings, such as, for example, brick of high soluble sulfate content.

A cement-sand mix with a roughcast finishing treatment is most likely to be reliable; if a smoother appearance is required with a wood floated finish, the sand should be as coarse as possible and every care taken in application.

The suitability of the various treatments in respect of exposure conditions and environment is summarized in Table 1.

To be continued in November 1958 issue



meet the tripodome, a different type of concrete structure

This odd-appearing architectural accent for a Junior High School in Glendale, California was built in an unusual fashion. A horizontal platform was first erected and then a vertical member was placed in the center with a pin for the support of a revolving arched screed. With a clamshell crane dirt was then placed on top of the platform, packed down and screeded to within one-half inch of the desired finished surface of the underside of the dome. A coat of cement plaster was then poured on top of the dirt and screeded smooth. After this material had set, the concrete was poured to the full thickness of the dome and screeded to the desired finish line. After the concrete had set sufficiently a bulldozer was used to tip over the shores used to support the platform, causing the entire falsework (incuding shores, dirt and plaster) to collapse. The finished underside of the dome required virtually no patching. According to the superintendent for the contractor on this job the concrete poured in this fashion proved to be the least expensive of any used. The tripodome is 30 feet in diameter, dish-shaped and has a rise of 3 feet. It is carried on 3 arched supports of poured concrete. The method is based on the architect's recollection of how the tops of concrete cisterns were poured in the small Netherlands village in which he grew up. The architect is William Mellema of Los Angeles.

Wood or concrete? Only the closest examination can provide the answer. The grain cast into these concrete surfaces, plus the use of carefully selected and applied stains, makes the end result virtually indistinguishable from wood.

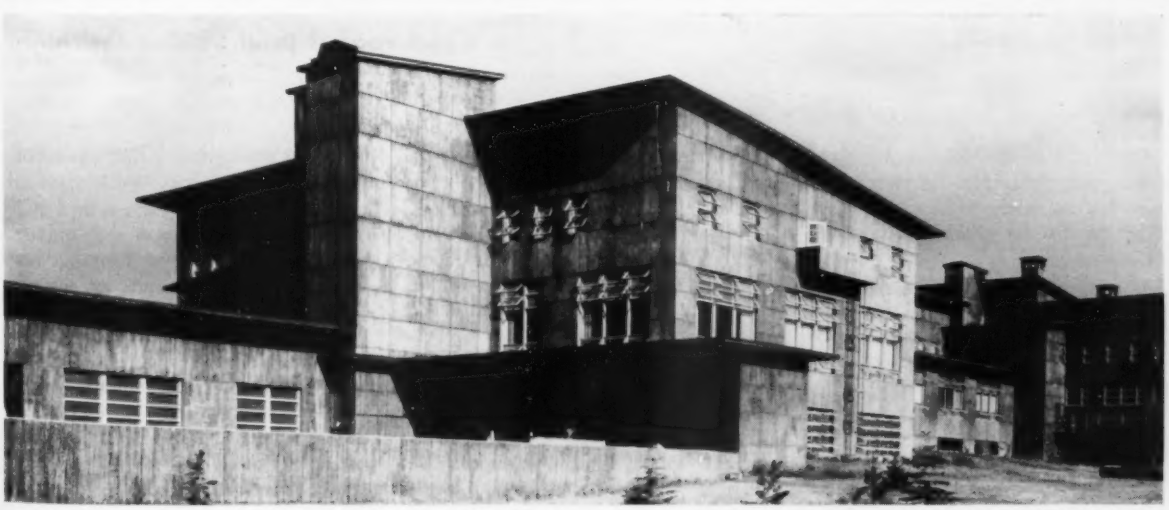
CONCRETE SIMULATES WOOD

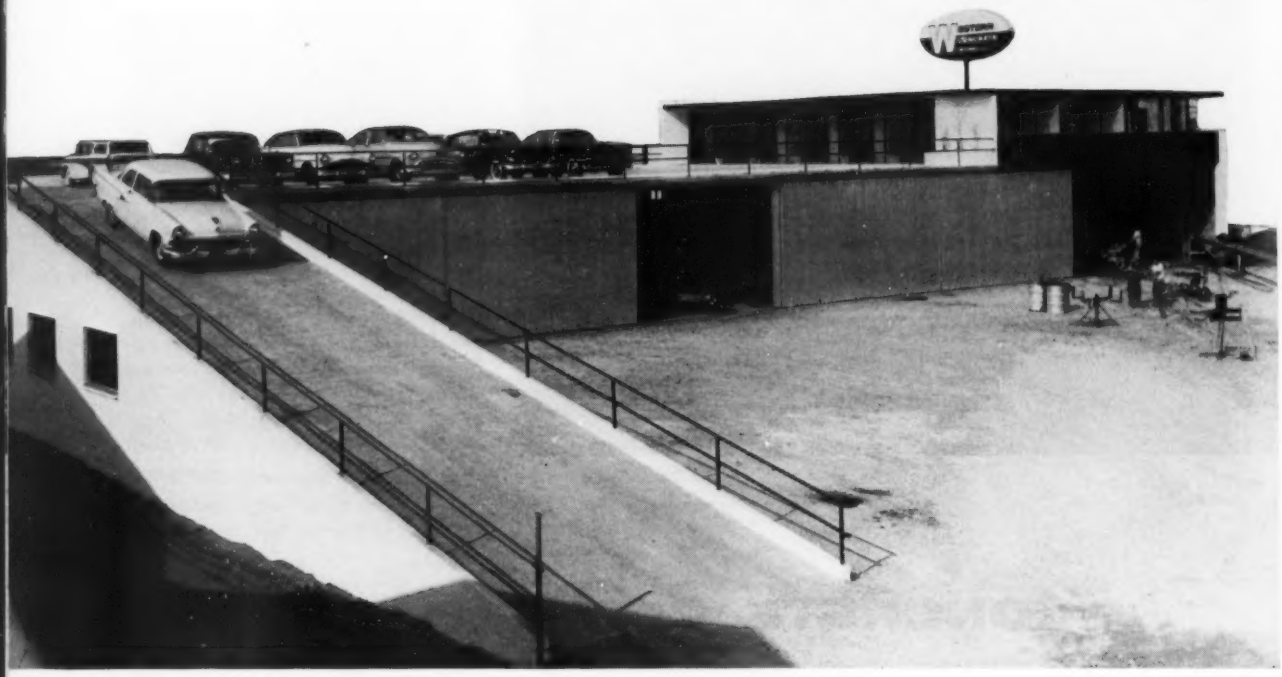
OUTSTANDING AMONG interesting features of the Jackson Lake Lodge at Moran, Wyoming, are reinforced concrete exterior walls which resemble wood. Plywood panels used as sheathing were steel-brushed to accent the natural pattern in the wood, creating the sculptured surface effect so plainly visible in the accompanying pictures. The finished concrete was cleaned and stained with brown acid stain to give a rustic appearance. Patterns of vertical and horizontal lines in the concrete also help to create the illusion of wood construction.

The reinforced concrete structure is 525 feet long by about 200 feet wide. Floors are concrete, covered with tile, except for the lounge floors, where the concrete was treated in the same manner as were the exterior walls—to look like wood. Fire hazards and maintenance are minimized by the use of concrete, and construction costs were lessened, since aggregates were available from local stream beds.

Because of the volcanic ash in the subsoil, piers were used for foundations. Holes were drilled to a depth of 30 feet with a 24-inch diameter auger and filled with concrete. Lightweight concrete joists, prefabricated in Salt Lake City and brought by truck to the site, were used in floor and roof systems. Corrugated metal forms over the joists supported the mesh-reinforced concrete slabs. This type of construction was chosen to save time in erection where so short a working season prevailed. END

Although the exterior walls of the Jackson Lake Lodge at Moran, Wyoming, are to all outward appearances of the rustic texture so clearly required by the environment, the construction is actually of reinforced concrete throughout.





Rooftop parking can solve one of the modern urbanite's most vexing problems, as well as create an important market for increased use of site-cast concrete. The structure shown here used almost 2½ times as much concrete as would have been required for either the timber or steel building with which it successfully competed.

CONCRETE PARKING DECKS

A new look at rooftop parking shows the possibility of using concrete roof slabs to double the amount of concrete in a building. Prestressing and lifting can make concrete cost the owner less than a wood roof if land values are high.

FILE: FLOORS

PLANNING COMMISSIONS, building codes, and frequently common sense can dictate to the owner of a new building that he needs a square foot of parking for each square foot of building. When the parking lot next door is going to cost $1.50 per square foot, as it often does in choice locations, the owner is better off on a first cost basis to use rooftop parking. Concrete is the best material for him to use, and when he does, the yardage on the job just about doubles.

Not all buildings are suitable for prestressed concrete lift slab roofs, but when one is, the average $2.00 per square foot roof cost is the best buy an owner can make. The requirements are an uninterrupted slab at grade (practically the same as for tiltup walls), reasonable column spacing, and a minimum of interior walls.

Most lift slabs in California are prestressed for deflection and crack control, long spans, and favorable cost. The lift slab sequence is the same for either reinforced or prestressed slabs. Slab lifting is done for the same reasons that make tiltup walls economical. The slab is cast on the grade slab and jacked up to final position by hydraulic gear mounted on top of the columns. Lift slab and tiltup work well together; however the tiltup walls are usually cast on a waste slab outside the building line and walked to their position.

The usual parking deck is about 15,000 square feet over an automobile agency (storage), retail store (customers), or office and light manufacturing buildings (employees and visitors). The recently completed shop

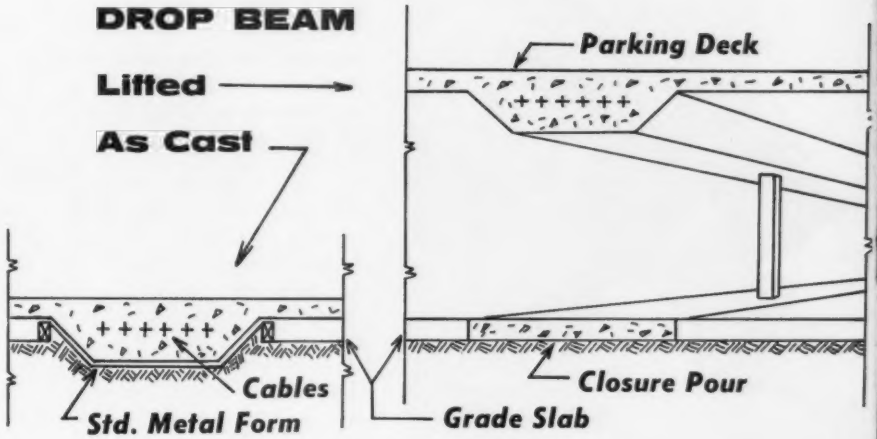
and offices of Western Concrete Structures Company, Inc., Gardena, California, is a good example of the use of prestressed concrete lift slabs and is the fifth in a series of similar structural systems.

Although the firm is in the business of prestressing and lifting, prefabricated steel buildings were first investigated for a fast, low cost headquarters building. In this case they were found to be no faster or cheaper than a lift slab structure, irrespective of parking.

The class of parking deck that appears most economical has several outstanding features. It consists of a 6-inch slab supported on columns spaced about 20 by 50 feet, although longer spans are possible. The slab cantilevers from 10 to 15 feet beyond the outside columns on the long span. The column strip in the long span is mostly a flat beam, from 3 to 4 feet wide and 12 inches deep. The beam is cast integrally with the roof slab, so that the total depth of the roof system is 18 inches from beam soffit to rooftop. This saves a foot or two in height of perimeter walls for the same headroom, and would be an impractical beam depth in any other material or even in precast prestressed joist systems.

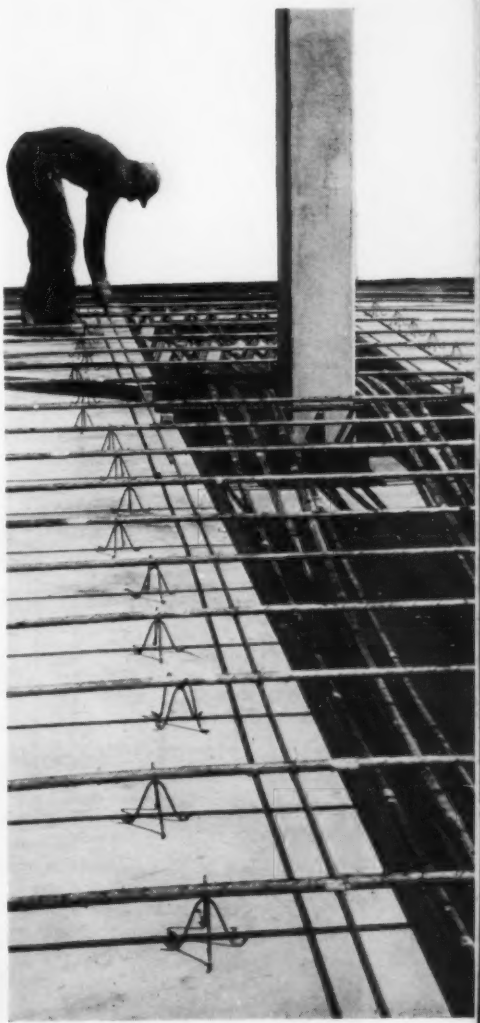
Because the flat beam, usually referred to as a drop beam, cannot be cast except by dropping the roof slab soffit 12 inches below the rest of the slab, a simple change must be made. This consists of blocking off the grade slab along the column strip and inserting standard steel forms with a 12-inch drop. Once the roof slab is lifted, it is a simple matter to finish placing concrete in the interrupted grade slab. As the sketch shows, the drop beam can be used only once in lift slab construction. If additional slabs are needed, the beams must be inverted to the top of the slab. This is fine for offices, but unsatisfactory for parking. For multistory parking, other prestressing layouts are more adaptable, such as a waffle slab on columns 36 by 36 feet.

The first few parking decks used steel pipe columns. Today's practice is to use precast concrete columns, and for the one-story jobs talked about here these are 12 by 12 inches. Beside the customary advantages of concrete columns, they are considerably stiffer during the lifting operation and can withstand construction loads without special bracing. One word of caution: All column dimensions must be plus or minus ⅛ inch or better, which makes for fairly expensive concrete as columns go. Even so, concrete columns in a concrete building have proved their economy in other ways, particularly when subjected to bumps from traffic.



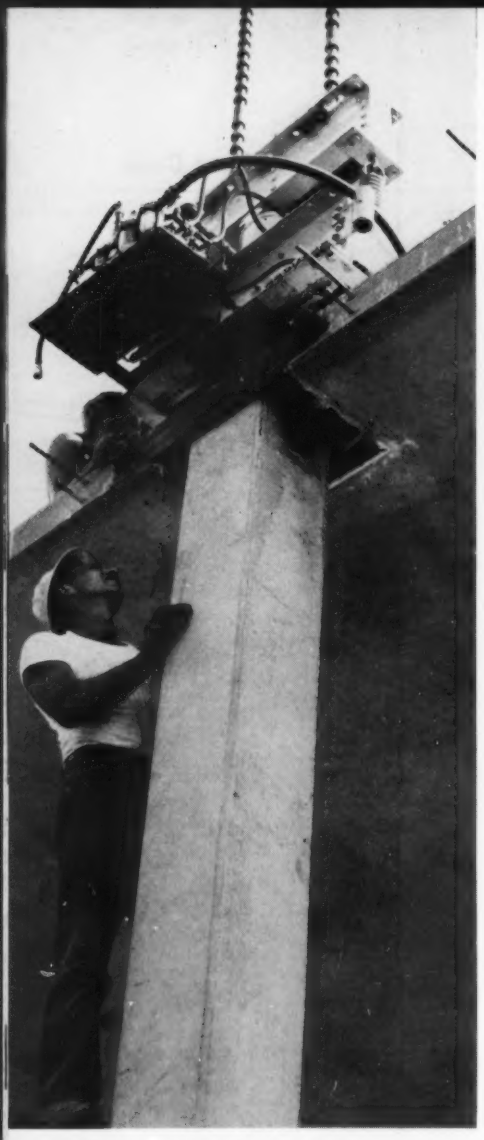
Drop beams were cast into the roof slab by blocking off the grade slab along the column strip and inserting standard steel forms with a 12-inch drop. Concreting of the interrupted grade slab is completed after the roof slab has been lifted.

The cable profile in the drop beams (flat beams cast integrally with the slab for one-way spans) is low at center span and high over the columns. Cables are coated with a special mastic and double wrapped to prevent bond and corrosion.



Only in the last two years or so have prestressed concrete lift slab parking decks been designed without roofing membrances. Roofing, at $15 per square, is not itself much of an item, but it must be covered and protected with a 2-inch wearing course, with corresponding dead load increases; and there is always the problem of maintenance. To eliminate roofing on parking decks is especially desirable, and makes sense when you realize that the concrete doesn't leak, but the cracks do. Prestressing in two directions removes the cracking problem. Service records now exist over a two-year period on exposed decks, with excellent results. The question is, why hasn't this been done sooner, especially when you consider the fact that circular concrete tanks, prestressed by the wire wrapping technique, have no roofing membrane on the walls.

The contractor's own building shown



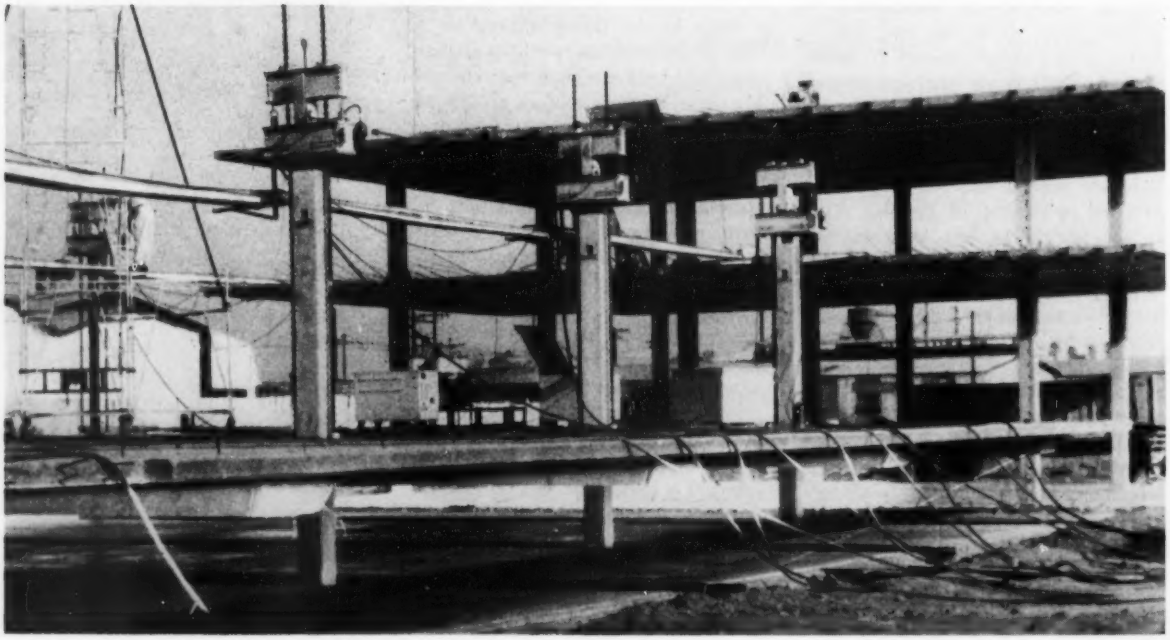
in the accompanying photographs is somewhat fancier than past jobs. For example, the ramp (cast in place) was made 16 feet wide, more than necessary, to provide 800 square feet of usuable storage space underneath. Load bearing walls in two areas are close to columns, too close for economy with permanent columns. Because the columns were needed for lifting only, temporary pipe columns were used and salvaged later. They were used for lifting and holding the roof slab in place until the walls were cured and ready to support the slab, some two weeks later. In the two-story office section at the end of the parking deck, three-sided lifting collars were used where columns occurred at the slab edge. In conventional lift slab construction, columns are always set in from the slab edge from 2 to 16 feet, never on the slab edge or at corners.

The concrete mix design was not exceptional in these days of specification concrete. The usual characteristics for slabs of this type are 1½ inch rock, 6 to 6½ sacks per cubic yard Type I or III cement, and 4-inch slump to give 4000 psi. at 28 days. As for any structural concrete, the slab was thoroughly vibrated and cured. A plasticizing admixture was used primarily as a water reducing agent. A colorless proprietary curing and sealing compound was used as a bond breaker, applied after all prestressing cables were in place (the reverse of the procedure used when rebars must be kept clean in a conventionally reinforced slab). Concrete for all slabs was placed at grade with crane and buckets, although runways and buggies would also be suitable.

Total elapsed time between ground breaking and moving into the offices was two and a half months, although the machine shop was in operation earlier. The building totals 10,000 square feet of machine shop at grade, 7,000 square feet of parking deck on columns 25 by 45 feet with a 15-foot cantilever, and 3,000 square feet of two-story office on columns 22 by 22 feet. The machine shop and parking deck cost $4.40 per square foot, and the two-story office $8.00 per square foot, including all trades. The job used 2.4 times the concrete that would have been needed for either a timber or steel building with which it successfully competed. END

LEFT: The lifted slab is secured by means of a steel shear key inserted through the concrete column. The electronically controlled lifting jacks were developed by Western Concrete Structures Company.

BELOW: The parking deck, shown in the foreground of this view, is in the process of being lifted. The 2-story office section at the rear had already been secured when this picture was taken.



Contractors Norville Latimer and Bob Kurth operating one of the hydraulic jacks used in post-tensioning the long, slender beams which were one of the features of a recently completed all-concrete warehouse in Seattle.

Impressive Advantages Mark Site Fabricated Post Tensioning Job

THERE IS A GROWING EMPHASIS these days on on-site operations in the field of precasting, prestressing and post-tensioning. Contractors and engineers who have had experience with on-site work report that it has some impressive advantages, and they mention such factors as greater flexibility (making it possible to handle last minute variations), the greater ease of scheduling and elimination of job delays, improved control over quality and workmanship, lower construction and maintenance costs, and finally the opportunity to use members having longer spans than those which can be trucked to many job sites.

A recent and important example of job fabrication in the Seattle area is an all-concrete warehouse for the storage of flour and grain products. The requirements of an odd-shaped site, the need for the minimum of interior columns to facilitate the maneuvering of fork trucks, and a tight construction schedule, all focused attention on the possibilities of using job-fabricated post-tensioned concrete beams having unusually long spans.

The post-tensioning technique applied on the project consisted of pouring the forms in an upright position on the floor slab. Because of the trapezoidal shape of one half of the building, all beams were of different lengths, ranging from 51 to 58 feet. However, the same forms were used for all beams, with adjustments in linear dimensions being made on one end.

Running through each beam were three bars of extremely high strength steel, 1 inch and 1⅛ inches in diameter. Placed in the forms before the concrete was poured, each of these

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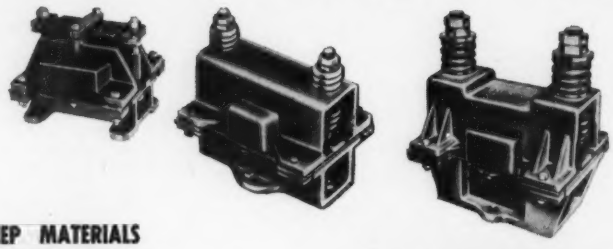

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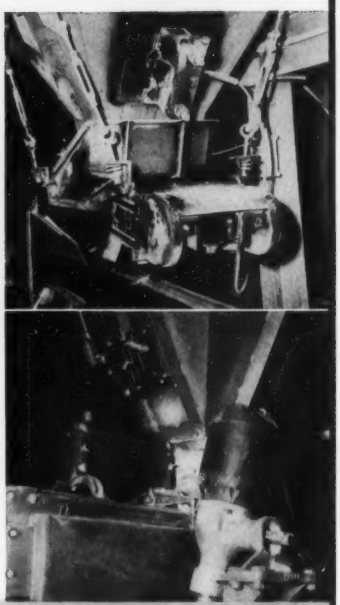

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draped tendons was encased in a light steel tube to prevent bonding to the concrete. In addition, they were firmly anchored to one end of the beam.

After the ready mixed concrete (6½ sacks of high-early strength cement per cubic yard) was placed and had reached the desired strength of 5,000 psi, hydraulic jacks were attached to the tendons at the unanchored end. Tensioning up to 105,000 psi was applied to the bars which were then anchored in the stretched condition by use of special wedges. To fill the space between the tendons and their surrounding steel sleeves, grout was pumped into a small opening left for this purpose. About the thickness of whipping cream, this grout consisted of a slurry of neat cement and water in the proportions of not more than five gallons of water and 2 grams of unpolished aluminum powder per sack of cement.

When completed the 7½-inch thick beams represented a cost of only $6.00 per lineal foot, an extremely favorable figure when compared with the cost of steel or glued laminated wood capable of carrying the same load. The weight of the beams ranged from eight to nine tons.

The sidewalls of the warehouse also boasted an interesting feature. Each section was pre-cast with a vertical rib on both ends. When the panels were erected, adjoining ribs were bolted together and capped with a ⅝-inch steel plate. In this position the pair of ribs formed a pilaster to carry the roof beams.

The pilasters were designed so that the beam would be 12 feet 8 inches center-to-center. That allowed for standard 4- by 12-foot plywood panels for the roof forms, a measure that resulted in both economy and efficiency.

Total construction costs for the 19,000-square foot project came to $116,988, which figured approximately $5.00 per square foot for the warehouse space and twice that amount for the office areas consisting of 1000-square foot mezzanines at each end of the building.

A total of 1089 cubic yards of concrete was delivered for the job by Pioneer Sand & Gravel Company of Seattle. Concrete ranged in strength from 2,500 psi to 5,000 psi, depending on usage. Other participants in the project included Latimer-Kurth Construction Company, Architect Chester L. Lindsey, and Structural Engineer Richard H. Hadley. END

Here the aluminum transporter boom is shown in operation on the site of a housing project. Note that the assembly is free to pivot in order to permit servicing the maximum area with any one set up.

TRANSPORTER BOOM

smooths placement of concrete on a difficult job site

A MINOR BUT RECURRING PROBLEM in connection with the use of ready mixed concrete is the difficulty, especially where unstable ground conditions prevail on the job site, of maneuvering heavy trucks close to the form work or trenches being poured. While crane service, or the employment of runways and buggies, offer two relatively simple solutions to this problem, a different approach of possible interest to American contractors has been employed by a firm in Glasgow, Scotland.

This company has made use of a portable transporter boom for conveying ready mix over difficult ground areas. The photographs show the device in use on a housing development on which extensive trenching, the absence of suitable approach roads and the confinement of the site all contributed to the difficulty of concrete handling operations.

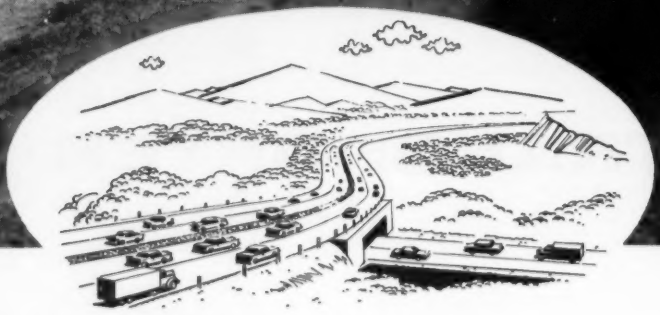
The boom pictured is of light aluminum construction with a 46-foot truss spanning the working area where foundation trenches had previously been prepared. The truss is supported at one end by a trestle up to which the truck mixer is backed. The concrete is poured into a bottom-opening bucket which runs on a trolley attached to the bottom chord of the truss.

The end of the boom nearest the truck mixer is supported from an A-frame in such a way that it is free to pivot; at the opposite end it is supported on wheels so that the entire assembly can readily be slewed into any desired position.

The boom was built by the British Building Research Station and loaned to the contractor for experimental use. Even though site conditions were not ideal, it was the builder's opinion that the device contributed to both the speed and the all-around smoothness of handling.

Using the boom, in one day three men placed 52 cubic yards of concrete for the foundations of a building 66 feet long by 30 feet wide. Two men worked at spreading while only one man was generally required to handle the boom skip. The builder's experience on other jobs indicates that site mixing would in this case have necessitated a crew of seven men, allowing two for spreading and five to operate mixers and wheelbarrows. END

first New Highway-Act pavement...



POZZOLITH* employed in concrete

Placing the first concrete pavement in the 41,000-mile Interstate Highway System to be constructed under the Federal-Aid Highway Act of 1956: A 4-mile stretch of 24-foot concrete pavement on U.S. Route 40 west of Topeka, Kansas. Kansas State Highway Commission. Contractor: Koss Construction Co., Kansas Division. Pozzolith employed in concrete.

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questions and answers

QUESTION: Do you have a photograph showing a failure of concrete due to alkali-aggregate reaction?

ANSWER: The accompanying photograph shows alkali-aggregate reaction in concrete used in a bridge structure in California. This is probably a somewhat extreme example.

QUESTION: What capping material results in the highest strength showings of concrete test cylinders?

ANSWER: Most studies show that the highest readings are obtained with cylinders capped with high-alumina cement. Gypsum plasters, sulfer cements, sulfur alone, or mixtures of plaster of Paris and portland cement, all result in lower compressive strength readings.

QUESTION: Is it true that test cylinders with uneven ends give lower readings?

ANSWER: Yes. Convex ends create the most trouble. Laboratory investigation indicates that convexity of as little as 0.01 inch in the cap of a cylinder may reduce the compressive strength by as much as 25 percent.

QUESTION: How is nailing concrete produced?

ANSWER: One technique is to use a mixture consisting of equal parts (by volume) of standard portland cement, sand and pine sawdust. Enough water should be used to result in a slump of one to two inches, and there should be a moist curing period of two days, and a drying period of one day, before nailing is started. Studies conducted in the laboratories of the Bureau of Reclamation indicate that the sawdust should be clean and free from chips and lumps that will be retained on a screen with ¼-inch square openings, and not so fine that it will all pass a No. 14 screen. Sawdusts from cedar, Oregon fir, hickory, oak and birch trees are not suitable for making sawdust concrete.

QUESTION: Is there any objection to using internal vibrators to help distribute concrete in forms?

ANSWER: The internal vibrator is basically a compacting tool. Its use to move concrete from one point to another is almost certain to cause segregation.

QUESTION: What could cause progessive pop-outs to occur in a concrete slab during the removal of damaged surface concrete?

ANSWER: The most likely possibility is that the slab was under stress while the work was being done. Even though the surface concrete was loose, its removal would cause enough redistribution of stress to result in pop-outs. A slab being worked on in this fashion should be supported from below until the damaged concrete has been removed and resurfacing has been completed.

QUESTION: Are any recent figures available on the progress of the Interstate Highway System?

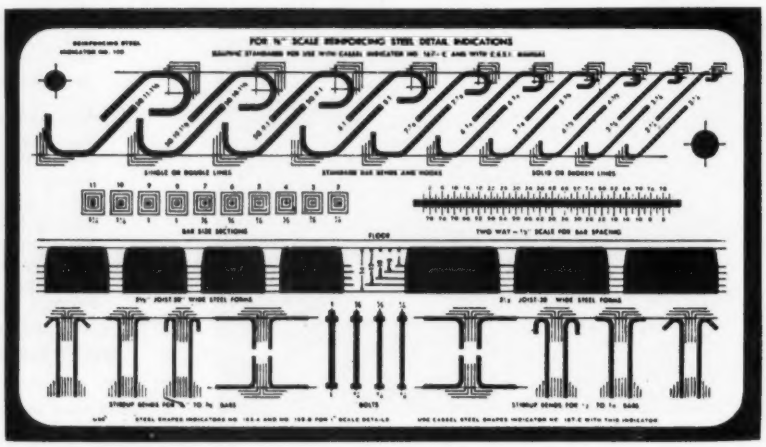
ANSWER: From July 1, 1956, when the program began through November 30, 1957, the total work completed on the Interstate System amounted to 1209 miles. Projects under construction during November, 1957, totalled 1958 miles, and the mileage programmed as of November 30 amounted to 4437 miles.

QUESTION: Do you have any information about a thermosetting plastic material that is being used for resurfacing old pavements?

ANSWER: The product referred is probably Relcote, manufactured by Reliance Steel Products Company. This material is applied to old surfaces in layers ranging from ⅛ to ⅜ of an inch in thickness. It sets up hard within a few hours and is said to form an excellent bond with such materials as concrete, wood, asphalt and steel.

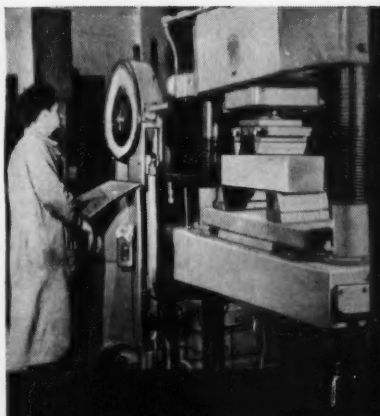
QUESTION: Does the practice of retempering concrete always result in a loss of strength?

ANSWER: Probably, although not to the extent that might be expected from the effect on the water-cement ratio. There are indications that a given amount of water used in retempering reduces strength only about half as much as the same amount of water added to the mix originally.



QUESTION: Does anybody make templates designed to speed up the detailing of reinforcing steel?

ANSWER: The only template of this kind we are familiar with is available from A. Lawrence Karp, P. O. Box 242, Greenwich, Connecticut. The template which is reproduced here includes bar bends and hooks, bar size sections, concrete forms and stirrup bends. The actual size is 5⅜ by 9⅞ inches.



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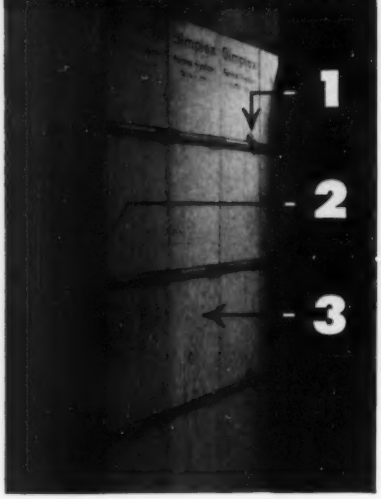

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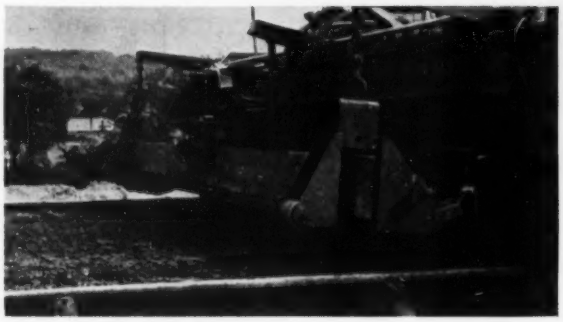
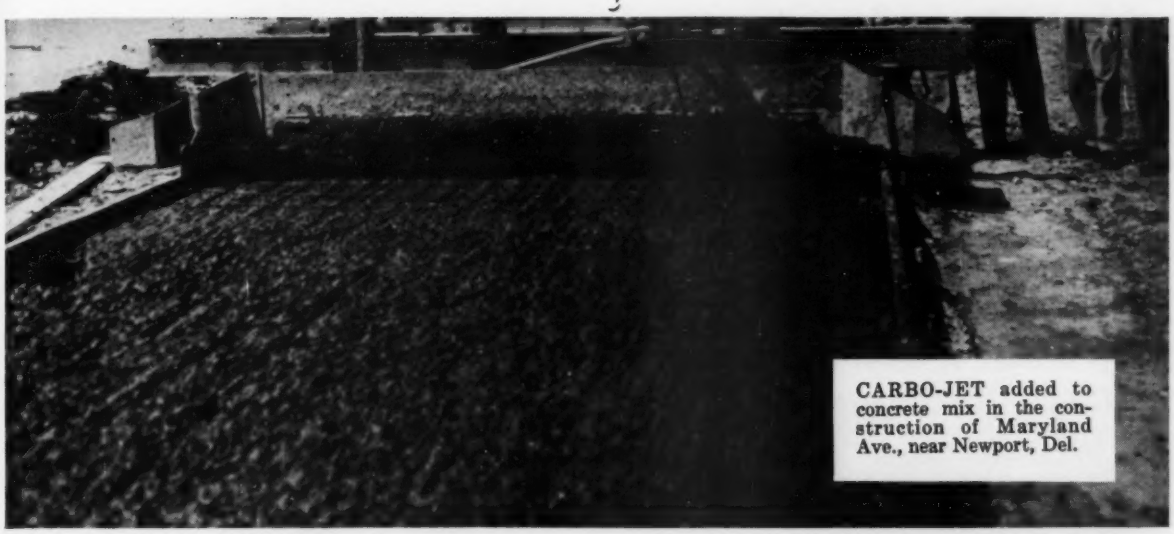


Vibrating Screed

Specifications for this New York state highway called for vibration. Camarco Contractors of Carmel, New York, had no vibration attachment on their spreader. This problem was solved by attaching to the road spreader a Stow vibrating screed which is ordinarily pulled by hand. The screed was lifted off slab by hydraulic lift. When lowered in place chains attached to rollers pulled it. After striking off, the slab was finished with a road finishing machine. **Stow Manufacturing Company, 443 State Street, Binghamton, New York.**



CARBO-JET added to concrete mix in the construction of Maryland Ave., near Newport, Del.

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equipment tools materials

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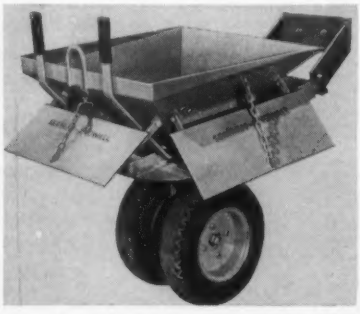
Materials Spreader

The uses of this 2 cubic foot spreader range from conventional chip or sand spreading on fresh bituminous or tar application to highly controlled spreading of abrasives, salt or calcium chloride in ice control in highway con-



struction. Spread can be adjusted to any direction. Lever operated gates control volume and an agitator prevents bridging of materials. **Seaman-Andwall Corporation, 305 North 25th Street, Milwaukee 3, Wisconsin.**

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Burlene is a combination of burlap and Visqueen Film (polyethylene) which combines the strength of burlap with the vapor seal of polyethylene to give complete curing. This method has been used by many road and building contractors who are reported to have found Burlene a money-saving item, as compared to other methods of curing concrete. Write **Max Katz Bag Company, 312-16 South New Jersey Street, Indianapolis 4, Ind.**

Tamper

A new tamper is said to eliminate the 4 or 5-man crew or 10-ton roller usually needed for compacting granular material such as sand, crushed stone and gravel. Weighing only 242 pounds, the tamper produces a 2,300-pound impact with 2,350 vibrations per minute. It is self-propelled and travels up to 55 feet per minute. A special carburetor prevents starting difficulties and handle vibration is reduced by two sets of shock absorbers which are composed of opposing springs. This mechanical arrangement requires less maintenance than hydraulic fluid-type absorbers, according to the manufacturer. Write **Vibro-Plus Products, Inc., P. O. Box 368, Stanhope, N. J.**

Soil Testing Device

This compact, portable soil testing apparatus is simple to operate and maintain. Readings can be taken in about 3 minutes after hole is dug and successive determinations can be made

on layers in the same hole up to 22 inches deep. The device will test a wide range of soils, fine or coarse. **Charles R. Watts and Company, 4121 Sixth Avenue, N. W., Seattle 7, Washington.**

Adding Machine

A special adding machine for surveyors and engineers that adds and subtracts degrees, minutes, seconds and thousandths of seconds and converts thousandths of seconds automatically into seconds, seconds into minutes, and minutes into degrees is now available. The portable machine, in either electric or manual models, prints all essential figures and clear symbols on an easy-to-read tape for convenient checking and a permanent record. Write **Victor Adding Machine Company, 3900 North Rockwell Street, Chicago 18, Ill.**

Bridge Finisher

The Rex Bridge Finisher is tailored to customer specifications and produced on a made-to-order basis. It can be converted into a standard road finishing machine with a minimum of labor and is adjustable both in elevation of the screed and in frame width. Although one machine can take care of most width requirements, a frame widener is available to provide quick width changes where desired. A crown change attachment for easy transition work and a hydraulic transportation rig with pneumatic tired wheels, hydraulic lifting pedestal and hinged towing tongue for efficient moving between job-sites may also be obtained. Write **Chain Belt Company, 1600 West Bruce Street, Milwaukee, Wisc.**

Construction Torch

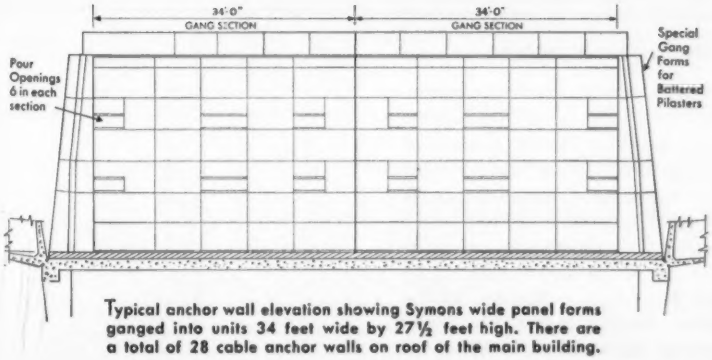
This burner with umbrella-style hood stays lit under most adverse weather conditions. Simple cam-type coupling allows easy removal of square burner

for filling, yet locks securely. The torch is of 20-gauge steel, leak-proof in construction. The burner is attached to torch body with a chain, eliminating loss when filling. **Anthes Force Oiler Company, Fort Madison, Iowa.**

Diamond Bits

A new concrete thin wall diamond bit needs no special equipment for drilling through 14-inch concrete. The manufacturer claims it will drill accurately through reinforced concrete, cutting time and costs. It eliminates form work on projects where openings are 14 inches or less. Write **Hoffman Brothers Drilling Company, Box 426, Punxsutawney, Penna.**

Symons Forms Ganged for Anchor Walls



Typical anchor wall elevation showing Symons wide panel forms ganged into units 34 feet wide by 27½ feet high. There are a total of 28 cable anchor walls on roof of the main building.

ASSEMBLY COST ONLY 5c A SQ. FT.

Modern forming methods answer the need of the jet age on the new TWA hangar at New York's International Airport. Symons 4 x 6 and 4 x 8 foot panels ganged in units 34 feet wide by 27½ feet were used for forming the 28 anchorage walls which strandle the full 80 foot roof width of the main building.

By using this method of forming, the contractor, Grove, Shepherd, Wilson & Kruge, Inc., poured the hangar in place at the cost of a precast structure. Panels were assembled on the ground at a cost of only 5¢ a square foot. It took about 15 minutes for a crane to tilt a gang form off the slab and inch it into place on the roof. 15,000 square feet of Symons wide panel forms were used in this gang forming operation. Symons wide panel forms have steel struts and 2 x 4 cross members to strengthen the panel and minimize deflection during pouring. Tie holes in the steel struts allow insertion and removal of special ties. Any strength tie may be used, including Williams removable end ties. Individual panels are built in 6′ and 8′ lengths and 30″, 36″ and 48″ widths.

Project Manager, A. R. Maxwell, working closely with the local Symons forming engineer, devised this fast, efficient method of forming. This type service is available to all contractors, as well as the preparation from your plans, complete form layouts, bill of materials and recommendations for the best and least costly method of forming —there's no charge or obligation.

Symons Forms Shores and Column Clamps may be rented with purchase option—rentals to apply on purchase price. For more information on Symons products and service send for our FREE catalog.

Symons

SYMONS CLAMP & MFG. CO.

4271 Diversey Avenue Dept. K-8

Chicago 39, Illinois

Warehouses located in California, Kansas, Minnesota, Pennsylvania and Texas.

Sales offices and agents in principal cities.

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STEEL STAKES by *dee*

Patented

Always drives straight in any type of ground

12 nail holes 1" o.c. spirally arranged at 30°

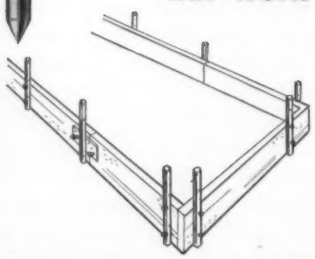
24 nail entry points

Always a Positive Nailing Position Regardless of Axial Rotation

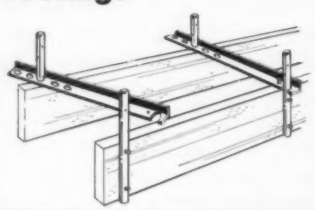
Set up 10 times faster
Strip 20 times faster
Get 100 or more reuses

SAVE TIME
SAVE MATERIAL
MAKE MONEY

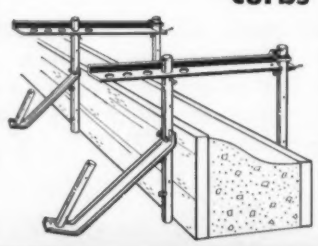
flat work



footings



curbs



dee CONCRETE PRODUCTS CO.
(Licensed Manufacturer)
670 North Michigan Avenue
Chicago 11, Illinois
MOhawk 4-3664

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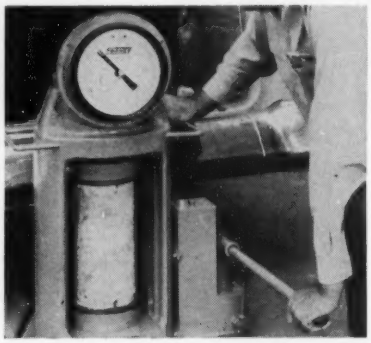
equipment tools and materials

Additional free information concerning these items may be obtained by mailing the reader service card located between pages 16 and 17.

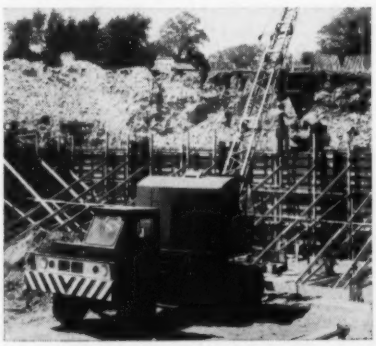


Compression Tester

Designed especially for jobsite use, the Forney cylinder tester with a capacity of 250,000 pounds can be transported in car trunk. The pressure gage is removable to eliminate damage in transit. Because of the unusually high capacity, cylinders testing as high as 8,500 psi can easily be broken. Metric gages are obtainable. **Forney's, Inc., Tester Division, P. O. Box 310, New Castle, Pennsylvania.**

Truck Crane

Shown starting the first wall pour of the new administration building at Schield Bantam Company in Waverly, Iowa, is this Bantam Model T-35 with a ½-cubic yard concrete bucket. The Bantam poured this 56-cubic yard wall section in six hours. An early summer completion date is scheduled for the building. **Schield Bantam Company, Waverly, Iowa.**

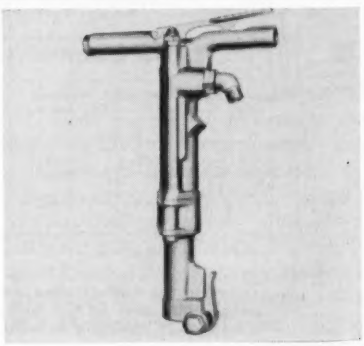


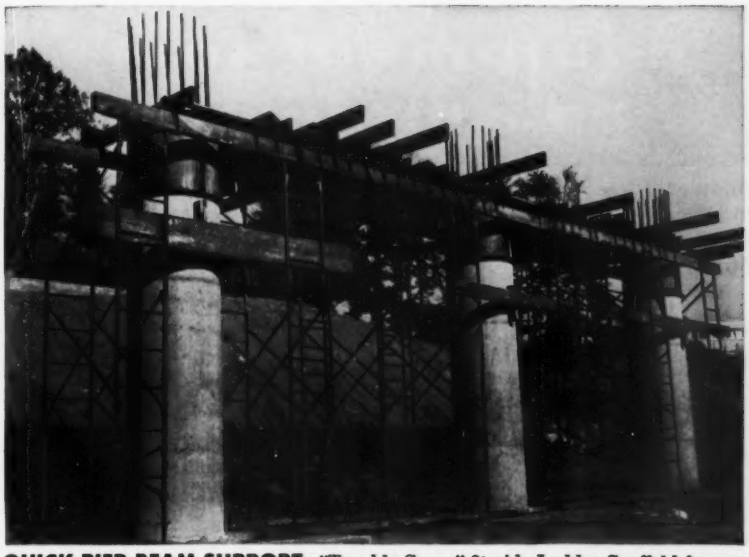
Earth Moving Machine

Pictured here is the Danuser Terra-Scoop, a tractor-attached earth mover which slices off high places, carries dirt to low places, dumps, levels and scarifies, without pulling long ropes or levers. With this machine contractors can send their heavy machinery on to bigger work and finish up with a scoop built for the job. **Danuser Machine Company, 539-44 East 3rd Street, Fulton, Missouri.**

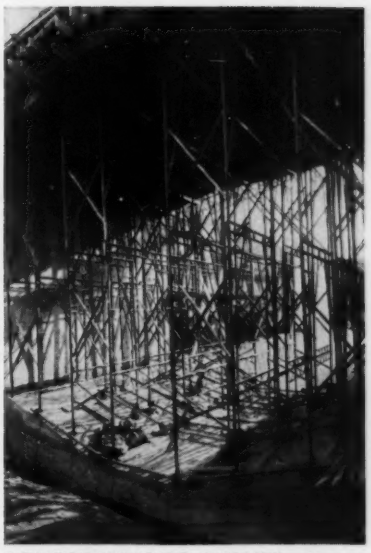
Lightweight Breaker

Especially suited for light demolition work, horizontal breaking, digging trenches, breaking frozen ground, or trimming, this 35-pound class breaker features a new latch type steel retainer and a simplified air connection. It is designed for durability and low maintenance. Its air cushioned hammer action makes it easy to operate. **Le Roi Division, Westinghouse Air Brake Company, Milwaukee 1, Wisc.**



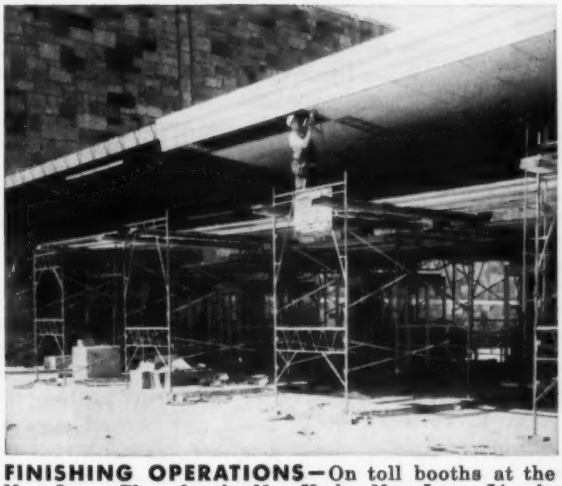


QUICK PIER BEAM SUPPORT—"Trouble Saver" 2'-wide Ladder Scaffold frames spaced 5' apart help contractor, M.D.A. Construction Co. provide easy access for forming work and support for one of 20 bridge piers on the Cross-Westchester Expressway, White Plains, N.Y. This photo shows forming and support for a pier beam 42" x 48" deep, 14' high. Many users of "Trouble Saver" Shoring say "its ease of handling means quicker job completion." Complete, accurate shoring layouts are a regular part of PS Co's engineering service available thru nation-wide offices or representatives that *sell* or *rent* "Gold Medal"® Scaffolds.

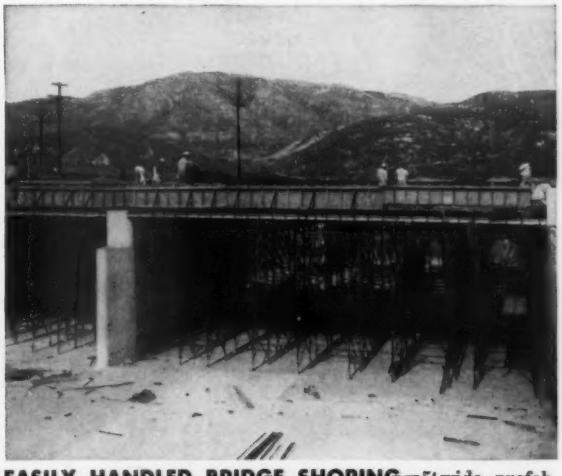


CONFORMING TO CURVES—Guy F. Atkinson Co., contractor, uses "Trouble Saver" Shoring to support Pacific Electric Ry. Co. concrete bridge, Los Angeles, over a sloped concrete channel base. Adjustable legs help meet both curves, top and bottom. Note 4" steel I-beams as stringers, furnished by PS Co.

Shoring Methods . . . for Highway Construction by The Patent Scaffolding Co., Inc.



FINISHING OPERATIONS—On toll booths at the New Jersey Plaza for the New York—New Jersey Lincoln Tunnel these "Trouble Saver" fixed Scaffolds are used to provide safe, level platforms for finishing work. The scaffolding components used here are the same as those used for shoring operations. By assembling them in towers and spacing to take the load, practically any shoring job can be done.



EASILY HANDLED BRIDGE SHORING—5'-wide prefab "Trouble Saver" Sectional Steel Shoring frames are handled easily by the crew for T. M. Page and RCT Corp., joint venturers, to obtain the correct support for the Cajon Blvd. Bridge over Devil's Creek Diversion Channel, San Bernadino, Calif. Two 6'6"-high frames, with extension legs, give 14' height. 4" steel I-beams used as stringers. 3'7" spacing between frames.

FOR GREATER SAFETY...EFFICIENCY...ECONOMY

GOLD MEDAL LADDERED SCAFFOLDING

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To help you with your scaffolding and concrete shoring methods, PS offers a complete nation-wide engineering service available to you locally. See the Yellow Pages in your 'phone directory for the nearest Patent Scaffolding office or representative that sells and rents "Gold Medal" Scaffolds.

Circle #715 on mailing card

RICHMOND

HANGERS for decks

SCREEDS for decks

TYSCRUS for walls

REINFORCING BAR SUPPORTS for steel support

SCREW ANCHORS for false-work support brackets

CONTINUOUS THREADED LAGSTUDS for columns and utility use

Every contractor on the Connecticut Thruway used Richmond products

In the roadbuilding field, where time is money, concreting contractors rely on Richmond to save both. Richmond products are often a major factor in the profit and loss picture.

You buy 46 years' experience when you specify Richmond products. The current handbook fully describes the entire Richmond line. Write for it, to: RICHMOND SCREW ANCHOR COMPANY, INC., 816 Liberty Avenue, Brooklyn 8, New York or 315 South Fourth Street, St. Joseph, Mo.

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equipment tools and materials

Additional free information concerning these items may be obtained by mailing the reader service card located between pages 16 and 17.

Form Board

A new flight-free, light-tan, mat-faced fiberglas form board has been designed for installation in exposed areas in plants, warehouses, and industrial areas not requiring whiteness and light reflection. It serves as a permanent form for poured-in-place light weight roof decks, as an interior ceiling, as an acoustical ceiling, and as roof insulation. It is incombustible and is a highly efficient thermal and acoustical form board, absorbing up to 75 per cent of the noise striking it, the manufacturer states. The product is available in sizes 32 by 48 inches and 24 inches by purlin spacing to 96 inches. Thicknesses are 1 or 2 inches in ¼-inch increments. Write **Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.**

Bushing

Designed to overcome two common problems frequently encountered by manufacturers of prestressed concrete units, a new friction reducing metal bushing in the arbor holes of reels for prestress strand assures that the roundness of the arbor hole will be maintained throughout the unreeling process. This eliminates the need for extra pulling force to turn the reel when an unfinished hole gets out of round. By reducing friction on the shaft, the bushing also permits exceptionally easy unreeling. Write **Leschen Wire Rope Division, H. K. Porter Company, Inc., 2727 Hamilton Avenue, St. Louis 12, Mo.**

Dispersing Agent

Chemcon, a dispersing agent, is said to be an effective aid in the production of high quality concrete and offers the possibility of formulating better and more durable concrete at an appreciably lower cost. It may be used to give slump and workability to otherwise harsh mixes when a low water-cement ratio is required to produce the desired high strengths, to entrain air in the desired range, to produce concrete of higher quality and greater compressive strength without an increase in the amount of cement in the mix, and to obtain specified strength and slump with a lower cement factor than would be required in standard concrete. Write **United Chemical Company, 16801 Euclid Avenue, Cleveland 12, Ohio.**

Concrete Drilling Machine

A new light weight concrete drilling machine swivels 360 degrees to allow drilling in any direction. It is recommended for use in installing conduit, pipe, duct, water line, and so forth, where many drilling operations must be performed in confined or hard-to-reach areas. The machine drills holes as large as 6 inches in diameter through concrete or any other hard building material at the rate of one inch per minute. A special kit is also available which will convert core drilling machines which drill only horizontally to 360 degree drilling machines. Write **Molco Drilling Machines, Inc., 1100-20th Street, N. W., Washington, D. C.**

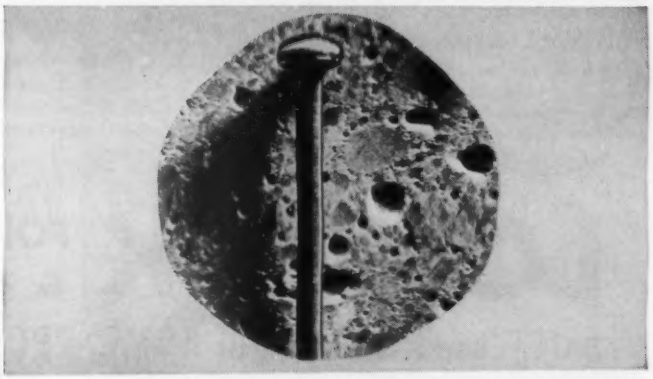
Epoxy-Based Compound

An epoxy-based polyplastic alloy is recommended by the manufacturer for waterproofing, skidproofing, patching, and joining concrete surfaces. Three types of the material are available, the first of which may be used alone or mixed with fine aggregate to form mortar. The second type is heavier and is used for vertical and overhead work and the third form is liquid and can be brushed, rolled or sprayed on, and is available in colors. It is claimed that the material will harden in 8 to 12 hours to average compressive strength of 35,000 psi and average tensile strength of 9,000 psi, and that it is completely water resistant up to a pressure of 4,320 psf. Write **Permagile Corporation of America, 34-43 Fifty-Sixth Street, Woodside 77, N. Y.**

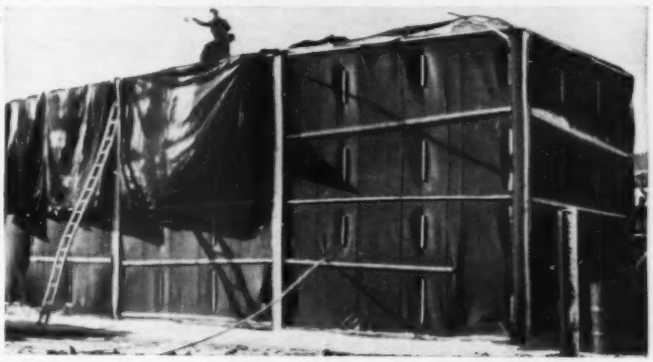
3 points to watch for better winter concreting

1. Plan ahead. Concrete will be delivered at a temperature between 50° and 70°F. Be ready to place at once. Have forms and reinforcing steel free from ice and frost—live steam works best. And, of course, never place concrete on frozen ground. It will settle when it thaws.

2. Specify air-entrained concrete for all jobs—structures and pavements. Resistance to freezing and thawing is greatly increased—freezing water in the concrete has room to expand harmlessly into the air cells. Magnified photo shows size of air cells compared with ordinary straight pin.



3. Provide suitable curing temperatures. Use protective coverings as needed, either with or without moist heat, to keep concrete at 70° or above for 3 days, or 50° or above for 5 days. Protect from freezing for at least 4 days. Rate of cooling concrete shouldn't exceed 1 or 2 degrees per hour.



quality concrete

Write for free literature on winter concreting.
Distributed only in U.S. and Canada.

PORTLAND CEMENT ASSOCIATION

Dept. 10-98, 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of concrete

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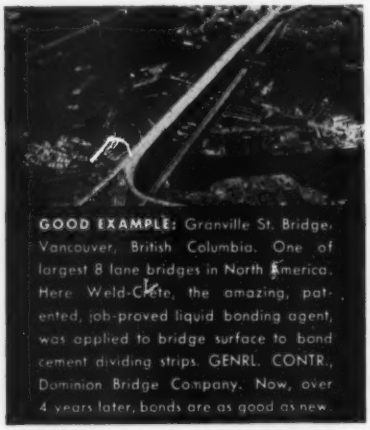
Bonds **NEW** to **OLD** concrete – less than 4¢ per square foot!



GOOD EXAMPLE: Granville St. Bridge, Vancouver, British Columbia. One of largest 8 lane bridges in North America. Here Weld-Crete, the amazing, patented, job-proved liquid bonding agent, was applied to bridge surface to bond cement dividing strips. GENRL. CONTR., Dominion Bridge Company. Now, over 4 years later, bonds are as good as new.

Weld-Crete *permanently* bonds new concrete, or cement plaster, *directly* to old concrete . . . or to any other structurally sound surface no matter how smooth! No costly, time-taking surface preparation. Just apply, let dry, and pour or trowel new concrete. Ideal for new construction, remodeling, repairs . . . *ramps, floors, precast shapes, driveways, highways, walls, machine mounts and pads.* Get fact-packed literature from your Weld-Crete Dealer, see Sweets File, or write us direct.

LARSEN PRODUCTS CORP., BOX 5756S, BETHESDA, MD.

equipment tools and materials

Additional free information concerning these items may be obtained by mailing the reader service card located between pages 16 and 17.

Curb and Gutter Forms

A strong magnesium alloy is used in the manufacture of curb and gutter paving forms which measure 1 foot wide and 10 feet long. The weight of each unit is 47 pounds. Twelve-foot-long forms are also available. The manufacturer says these forms are easy to handle, place and move. Write **Dotmar Industries, Inc., 502 Hanselman Building, Kalamazoo, Mich.**

Sealing Compound

Cushion Lock Sealing Compound is a leakproofing agent designed especially to eliminate all water and dust leaks between members that are subject to movement caused by expansion or contraction, flexing in wind, settling and earth tremors. According to the manufacturer, it provides a permanent seal that remains soft and pliable indefinitely, retaining its adhesion through wide temperature variations, with less than 4 percent shrinkage. While not a calk, it will do all things a customary calk will do. A dry cloth removes excess application. Exposure to air develops a thin, tough hide which prevents accumulation of dust and dirt and provides an excellent base for paint. The compound does not dry out, harden, chip, flake, crumble, chalk, crack, fall out or sag and run in heat. It sticks to all types of surfaces, wet or dry. Write **James E. Howard, Morrison and Company, 30 Melba Avenue, San Francisco 27, Calif.**

Drafting Aid

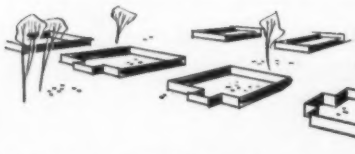
Drafting time can be reduced by the aid of press-on transfers which come in sheets containing general structural notes for reinforced concrete, with references to ACI Standards. Other sheets provide symbols and abbreviations used in concrete detailing. Lettering is in 1/16-inch high vertical capitals. The sheets are applied to the underside of the master drawing, and any set of data can be made to order. Write **Garrett Becker, Jeremiah Road, P. O. Box 535, Sandy Hook, Conn.**

Concrete Buggy

Designed to travel over narrow runways and through doorways as narrow as 31 inches, a new 10-cubic foot concrete buggy allows the operator to walk behind the machine or ride on a folding platform. A positive control mechanism provides for accurate dumping. Speeds up to 5 mph are obtainable with the buggy and it features a front-wheel chain drive, automatic clutch and forward and reverse drive. It is also available with a flat-bed body. Write **Whiteman Manufacturing Company, 13020 Pierce Street, Pacoima, Calif.**

LOV-LOK FORMS & TIES

being used for 6000 HOME PROJECT



at Elk Grove Village, Illinois for CENTEX CONSTRUCTION CO., INC.

LOV-LOK FORM SYSTEM is being used by the concrete subcontractor, IRVING C. PETERSON & CO., to set and pour up to eight foundations per day. This enables them to keep pace with the construction progress required for one of the largest home building projects in the country.

PREMIUM Form Ties . . . . . at REGULAR Prices!

LOV-LOK specializes in Form Ties for Concrete Construction. "NO TWIST" Flat Panel Ties, fitting several systems and our newer "FP" (Fast Pour) Snap Ties, which have many applications.

LOV-LOK FORM & HARDWARE COMPANY

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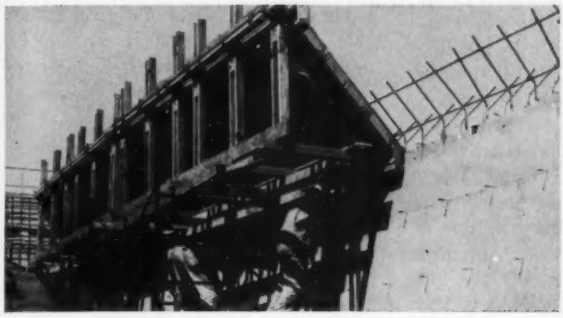
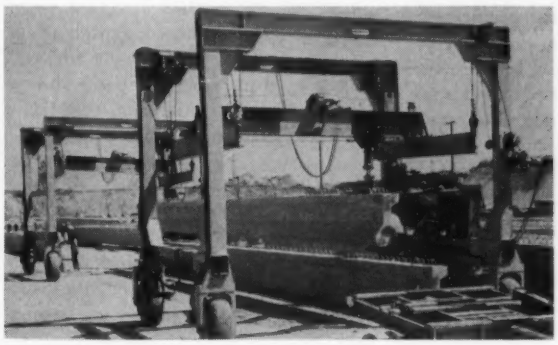
equipment and tools

For more information mail card facing page 16.



Gang Forming

The contract for this sewage tank at Columbus, Ohio, called for 5,000 lineal feet of "Y" walls and half "Y" walls, with 16-foot 9-inch high walls. To solve this problem Wander & Mason poured the walls in three lifts with the forms ganged for the final "Y" and half "Y" pours. Quality of the pour was said to be excellent and the speed of erection and stripping reduced costs. In all, some 12,000 square feet of Symons forms were used on the job. **Symons Clamp & Manufacturing Company, 4249 West Diversey Avenue, Chicago 39, Illinois.**



Hydraulic Lift

In the photograph prestressed girders are moved by two Travelift hydraulic lifts used in tandem. Lifting, propulsion and steering are all done hydraulically and all movements are controlled from the operator's platform by one man. The Travelift is also used in prestressed plants to pull strand, set caging, handle and set forms, pour forms and to perform many other jobs where heavy lifting and moving problems are involved. The unit can be modified to provide for increased dimensions where such changes are required. **Travelift and Engineering, Inc., Sturgeon Bay, Wisc.**

More EFFECTIVE WASHDOWN

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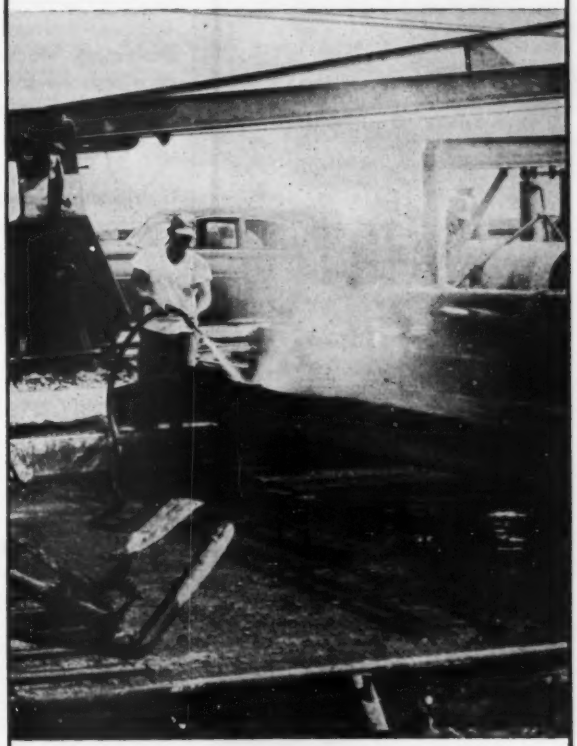
TRUCKS • PAVING MACHINERY MIXERS • EARTH MOVERS

CLEANS RIGHT DOWN TO THE PAINT!



- **ELIMINATES CHIPPING AND SCRAPING**
- **EXPOSES ALL LUBRICATION FITTINGS**
- **KEEPS EQUIPMENT LOOKING NEW**

This compact, portable washdown pump is powered by a four cycle gasoline engine. Can be used anywhere. Self-priming, no check valves. Delivery to 40 gpm—pressures to 150 psi.

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FLOMAX	MP STRAIGHT	*DURAFLEX*
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Goldblatt

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Many not sold elsewhere. Power Trowels. Power Carts. Transits. Scaffolding. Many new methods explained!

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1958 Walnut,
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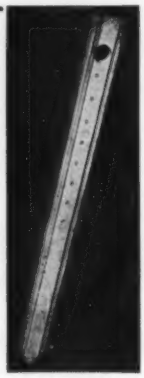
Tools and Equipment for the Trowel Trades

NEW *Hi Carbon Alloy* Steel Stake



Bracing
Footings
Curbs
Gutters

12, 18, 24, 30, 36 and 42 inch lengths.

Stake can be placed flat against lumber for secure nailing.

Symons

SYMONS CLAMP & MFG. CO.
4271 Diversey Ave., Chicago 39, Ill., Dept. K-8

We will be glad to send contractors a sample stake if request is received on company letterhead. Please include 50c for 12", 75c for 18", $1.00 for 24" stake to cover cost of postage and handling.

Name.....

Firm.....

Address.....

City..... Zone.... State.....

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literature

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Epoxy resin products. Bulletins on this firm's line of epoxy resin products for joining, laying coves, repairing of cracks and spalls by bonding new concrete to old concrete, exterior and interior weather and waterproofing, floor resurface and repair, skid-proofing, and coating industrial floors to resist chemicals are available. Specifications, directions and instructions concerning which product to use in each situation are included. American Metaseal Corporation, 607—65th Street, West New York, N. J.

Vibrators. Descriptions and specifications are presented in a bulletin on motor-in-head concrete vibrators and generators. Power delivered by these vibrators is easily set by the operator to give the best rate of vibration for any job. Because the generator and vibrator are electrically geared together the vibrator speed stays in step with any change made in generator speed. Chicago Pneumatic, 6 East 44th Street, New York 17, N. Y.

Specifications for bonding agents. These specifications are offered as a guide for writing project specifications for lathing and plastering, concrete work, exterior stucco or ceramic tile. They provide additional copies for the architect's actual office use, eliminating the need for copying such details from the firm's insert in Sweet's Architectural File. The specification text can be edited by marking up, crossing out, filling in blanks, and adding inserts necessary to fit each particular project. Larsen Products Corporation, Bethesda 14, Maryland.

Concrete equipment catalog. Catalog No. 580 covers Stow's complete line of concrete equipment, including universal electric vibrators, 60 cycle motor-in-head vibrators, power midget vibrators, gasoline operated vibrators, rotary trowels, portable concrete grinders, and vibrating screeds. Included also are complete directions for building your own prestressed screed beam. Stow Manufacturing Company, 354 Shear Street, Binghamton, N. Y.

Roadside weed control. A reprint of a paper on roadside vegetation control presented by Jay Shideler, highway superintendent, Huntington County, Indiana, before the 5th Annual National Highway Conference for County Engineers and Officials is available. It is an interesting account of Mr. Shideler's experience with chemicals for roadside weed control and gives valuable information for those who must deal with this problem. E. I. DuPont de Nemours & Company, Wilmington 98, Delaware.

Protective products. A reference manual, well indexed by use, describes a line of waterproofings, concrete floor hardeners, repair materials, cement colors, cement paints, admixtures, curing compounds, coatings and sealers. Procedures for use of each material and quantity required are given, along with general information about the material itself. Ceresit Waterproofing Corporation, 3227 South Shields Avenue, Chicago, Ill.

Dispersing agent. A brochure announces the formation of United Chemical Company which will market Chemcon, a concrete conditioner. Data sheets from two independent testing laboratories provide full information about the material. Results showed increases in compressive and flexural strength, durability and surface hardness when this admixture was used, as well as decreases in shrinkage, bleeding and segregation, absorption, and permeability. United Chemical Company, 16801 Euclid Avenue, Cleveland 12, Ohio.

Better concrete handling. "Gar-Bro Concrete News" is a news sheet published two or three times a year in the interest of better concrete handing. It contains interesting stories and pictures of outstanding construction projects. Gar-Bro Manufacturing Company, 2415 East Washington Boulevard, Los Angeles 21, Calif.

Air hoist. Illustrations and descriptions of the Thor H-1000 lightweight air hoist are presented in bulletin No. 2367, as well as tables on rate of ascent and descent under various load conditions and air pressures. Thor Power Tool Company, Prudential Plaza, Chicago 1, Ill.

literature

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Loader and elevating machine. Functioning as a front-end loader, the Scoopmobile can be quickly and easily converted to a material handling and elevating machine, capable of high lifts. Interchangeable attachments include ¾-cubic yard buckets, lift forks, ¾-cubic yard concrete hoppers, a 5-foot crane boom and a backfill blade. Pictures show the various uses of the machine with the different attachments in a folder available from Mixermobile Manufacturers, Inc., 8027 N.E. Killingsworth Street, Portland 20, Oregon.

Uniformity of concrete strength. Differences in the strength-producing properties of cements are generally recognized, but the effect of these differences is not always understood. "Uniformity of Concrete Strength as Affected by Cement," Bulletin 77, published by the Engineering Division of the National Ready Mixed Concrete Association deals with the problem of non-uniform concrete strengths resulting from lack of uniformity of portland cement. Single copies are available on request. Additional copies up to 10 are 15c each with discount for larger quantities. National Ready Mixed Concrete Association, Munsey Building, Washington, D.C.

Cement manufacturing. Thirty excellent photographs and a flow chart accompany a description of the cement manufacturing process in the Calaveras Cement Company's San Andreas plant. The 16-page brochure will be distributed to plant visitors and at showings of a new Calaveras film, "Penny a Pound." It also may be obtained by writing Calaveras Cement Company, 315 Montgomery Street, San Francisco 4, Calif.

Prestressed concrete. Booklet No. 343, "Build for the Atomic Age," explains why prestressed concrete is the one building material that can practically resist the shock of an atomic blast in the 5- to 20-mile area. Leap Associates, P. O. Box 1053, Lakeland, Florida.

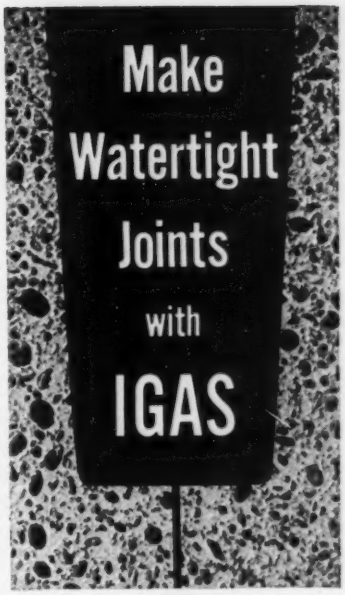
Bulk materials handling equipment. Catalog 586 contains 64 pages of product illustrations, descriptions and specifications on Syntron's line of vibratory bulk materials handling equipment and other products. Items listed include vibrators, packers and jolters, car rappers, hopper level switches, flow control valves, electromagnetic feeders, conveyors, elevators, screens, test sieve shakers, weigh-feed equipment, parts feeders, power tools and concrete finishing equipment. Syntron Company, Homer City, Pa.

Waterproofing agent. Specifications and uses of Thompson's Water Seal are presented in an 8-page bulletin, 4/TH. This material is said to protect and preserve paint finishes, protect wood from moisture penetration, seal concrete forms, assure efficient concrete curing and provide clean, smooth bond breaking. The bulletin gives complete information as to when and how to use it effectively in all types of building. E. A. Thompson Co., Inc., 1355 Market Street, San Francisco, Calif.

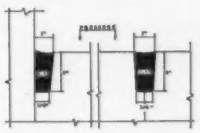
Highway testing apparatus. Fifty-one pages of equipment for testing soils, concrete, asphalt, aggregate and bituminous materials, as well as balances, ovens and miscellaneous laboratory equipment are pictured and described in catalog No. 10, "Highway Testing Apparatus for Soils, Cement, Asphalt, Concrete, Aggregates." Good indexing makes the catalog a ready reference manual for the equipment. Hogentogler and Company, 5218 River Road, Washington 16, D. C.

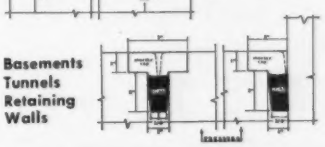
Vibratory screed. A 4-page brochure, JE 2346, outlines the engineering features of Thor's vibratory concrete finishing screed. This lightweight screed has double beam construction with "strap-action" for strike off and compacting to finish concrete slabs in one operation. Thor Power Tool Company, Prudential Plaza, Chicago 1, Ill.

Construction bulletin. A new bimonthly news bulletin containing time and money-saving construction ideas, new product information, on-the-job case studies, and other helpful articles relating to the building industry is now available free of charge to anyone requesting it. Simplex Forms System, Inc., 5605 Industrial Avenue, Rockford, Ill.



Igas Joint Sealer is a non-meltable, mastic waterstop that is easily applied to joints after the concrete has hardened. Igas will not dry out or become brittle when subjected to climatic changes. It can be placed in vertical, horizontal and overhead joints, thus forming an effective, watertight seal. Igas is ideal for foundations, basements, swimming pools, tunnels, etc. For complete information about Igas, write for Bulletin IS-56.





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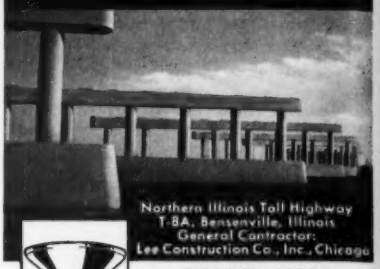

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